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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,862	03/04/2002	Xuesong Chen	9351-97	9938

1059 7590 11/19/2003

BERESKIN AND PARR
SCOTIA PLAZA
40 KING STREET WEST-SUITE 4000 BOX 401
TORONTO, ON M5H 3Y2
CANADA

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/086,862

Applicant(s)

CHEN ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2002 .
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-25 is/are pending in the application.
- 4a) Of the above claim(s) 22-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____ .
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3-4 .
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____ .

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species of the claimed invention:

Species 1: the method of operating the fuel cell system by supplying oxidant in an amount less than stoichiometric amount required (claims 13-21);

Species 2: the method of operating the fuel cell system by supplying oxidant in an amount greater than stoichiometric amount required (claims 22-25);

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claim is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to

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be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

2. During a telephone conversation with Samuel Frost on 11/07/03 a provisional election was made without traverse to prosecute the invention of Species 1, claims 13-21. Affirmation of this election must be made by applicant in replying to this Office action. Claims 22-25 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

4. This application is a division of Application No. 09/592950, filed 06/13/00. A later application for a distinct or independent invention, carved out of a pending application and disclosing and claiming only subject matter disclosed in an earlier or parent application is known as a divisional application or "division." The divisional application should set forth only that portion of the earlier disclosure which is germane to the invention as claimed in the divisional application.

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5. With respect to the domestic priority, the current status of the parent nonprovisional application(s) should be included.

Information Disclosure Statement

6. The information disclosure statements (IDS) submitted on 03/03/03 (paper # 3) and 08/04/03 (paper # 4) were considered by the examiner.

Drawings

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 18, 27. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

8. The drawings are objected to because certain reference numerals in Figures 1, 3B, 3C and 4 are not clearly legible. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

9. The preliminary amendment (paper # 2) filed 03/04/02 is objected to because the status identifier for claims 17-25 is improper. That is, since claims 17-25 were originally submitted along with the original disclosure, any amendment to the foregoing claims and thus their respective status identifier should read “currently amended” rather than “new” as presented in

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the preliminary amendment. Accordingly, amended claims 17-25 which were submitted in the aforementioned preliminary amendment have not been entered. For purpose of prosecution, only originally submitted claims 17-25 are being (or will be) considered and treated on the merits unless applicant re-submit a proper amendment complying with the revised manner of making amendments as set forth in the MPEP. Applicant's attention is kindly directed to MPEP 714 Amendments, Applicant's Action, III. REVISED MANNER OF MAKING AMENDMENTS for further details.

10. The disclosure is objected to because of the following informalities: *(in the Brief Description of the Drawings)* it is noted that the specification does not contain a description for Figure 3C . Appropriate correction is required.

11. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. *It is noted that the title is not drawn to the method of operating the fuel cell per se.*

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 13-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Condit et al 6416891.

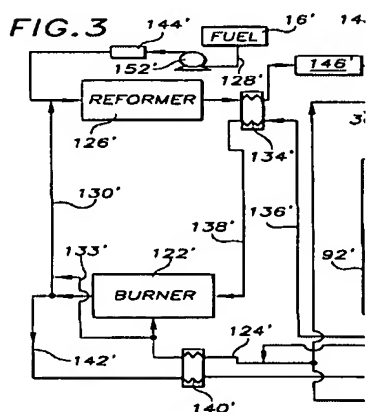
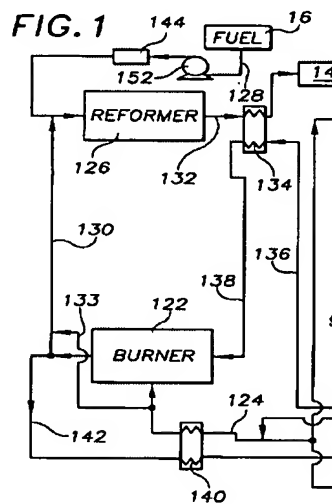
The instant application is directed to a method of operating a fuel cell system wherein the claimed inventive concept comprises the specific employment of the catalytic reactor

With respect to claims 13, 16-17:

Condit et al disclose an operating system for a fuel cell power plant (abstract) wherein the fuel cell comprises a plurality of fuel cells typically arranged in a stack surrounded by an electrically insulating frame structure that defines manifolds for directing flow reducing, oxidant, coolant and product fluids; each individual cell generally includes an anode electrode and a cathode electrode separated by an electrolyte (col 1, lines 19-24); wherein a reactant or reducing fluid such as hydrogen is supplied to the anode electrode, and an oxidant such as oxygen or air is supplied to the cathode electrode. In a cell utilizing a proton exchange membrane (PEM) as the electrolyte, the hydrogen electrochemically reacts at a surface of the anode electrode to produce hydrogen ions and electrons (col 1, lines 25-30). It is further disclosed that a solid polymer electrolyte is well-known in the art (col 1, lines 39-41). It is further disclosed that fuel cells utilizing PEM electrolytes typically involves securing an appropriate first catalyst layer between a first surface of the PEM and a first or anode porous substrate layer to form an anode electrode adjacent the first surface of the PEM, and securing a second catalyst layer between a second

surface of the PEM opposed to the first surface and a second or cathode porous substrate layer to form a cathode electrode on the opposed second surface of the PEM; the anode catalyst, PEM, and cathode catalyst secured in such a manner are well-known in the art, and are frequently referred as to a membrane electrode assembly (col 1, lines 54-65).

Figures 1 and 3 below shows that the burner 122 per se supplies an exhaust stream 130 to the reformer 132 which further process the fuel to be fed into the fuel cell.



It is also disclosed that the operating system includes fuel processing component means for processing hydrocarbon fuels into reducing fluids appropriate for providing fuel to an anode

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electrode of the fuel cell (col 12, line 65 to col 13, line 1). *The fuel processing component means may include a burner that may be a conventional or preferably a catalytic burner that oxidizes any excess reducing fluid such as hydrogen fed to the burner as an anode exhaust stream through the anode exhaust passage after passing through the anode flow field; and a first reformer feed branch of the split oxidant passage secured in fluid communication with the inlet branch of the split oxidant passage and with the burner that directs a portion of the process oxidant stream into the burner; a reformer that receives a combusted burner exhaust stream from the burner in the reformer feed line between the burner and the reformer; and a reformed fuel discharge line that directs reformed fuel from the reformer into the reducing fluid inlet (col 13, lines 3-22). Therefore, the combusted burner exhaust stream within the reformer feed line may be supplemented by, or replaced by a portion of the process oxidant stream directed to the reformer feed line (col 13, lines 25-30).*

Examiner's note: *As to the oxidant being supplied in an amount less than the stoichiometric amount required, the examiner asserts that even though the burner exhaust stream leaving the burner 122 might be combusted to be nonflammable, somehow, certain degree of combustion incompleteness may occur in the burner so as to leave any unused or uncombusted fuel (thus, there will be more fuel than oxidant in the system; and somehow, at least oxidant will be more consumed and after certain period of time oxidant supply will be deficient in amount with respect to the required combustion degree) in the burner exhaust which is then supplied to the reformer and thereafter to the fuel cell as reformed fuel. In that, it is pointed out that under normal operating conditions it is very unlikely that a full-complete (100 %) combustion takes place in the burner so as to totally and entirely burn or combust all the fuel*

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therein without leaving any un-combusted amount fuel. It is further noted that certain degree of combustion incompleteness is broadly understood by the examiner as any combustion process in which the act or instance of burning the fuel is not 100 %.

On the matter of claims 14-15:

Condit et al disclose the operating system for a direct antifreeze fuel cell (COL 7, lines 30-50) encompassing specific thermal management (COL 6, lines 43-47); wherein the antifreeze fuel cell power plant process hydrogen rich reducing fluid under certain conditions (COL 6, lines 47-52); and wherein the antifreeze cooled fuel cell power plant directly transfer mass and heat leaving the power plant back into the plant through a mass transfer medium supplied from the thermal management system (COL 6, line 66 to COL 7, line 3). *Thus, Condit et al's fuel cell system is able to set forth initial start-up steps as well as post start-up steps.*

With respect to claim 18:

It is disclosed that the catalytic combustor receives the particular reactant streams through conduits (col 5, lines 35-40 and col 6, lines 9-12). *Thus, a conduit generally has a piping/tubing shape.*

As for claim 19:

The fuel cell comprises a plurality of fuel cells typically arranged in a stack surrounded by an electrically insulating frame structure that defines manifolds for directing flow reducing, oxidant, coolant and product fluids (col 1, lines 18-22).

With respect to claim 20:

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Condit et al disclose that it is well known that with packed beds, etc, liquid water will vaporize and pass into the gaseous reducing fluid and process steams to increase the humidity of both the reducing fluid and the process oxidant (COL 16, lines 25-31).

As to claim 21:

Condit et al use a fluid delivery device such as coolant and fuel pumps (COL 8, lines 10-12/COL 14, lines 59-60)

Condit et al disclose a fuel cell operating system according to the foregoing. However, Micheli et al does not specifically disclose the particular catalytic reactor and its tubular shape.

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the particular catalytic reactor as Condit et al disclose that the fuel processing component mean includes a burner that may be preferably a catalytic burner that oxidizes any excess reducing fluid. Thus, those of ordinary skill in art would understand that catalytic reactors can be employed because they facilitate oxidation reaction of fuel and generate water, and operate at suitable low temperatures ranges. Accordingly, this fuel cell system may provide a thermodynamically optimized system for electrical power production due to the specific power generating elements configuration. Further, the cycle efficiency can be enhanced by adding all of the heat energy obtained from unreacted and reacted stream effluents to/from the fuel cell anode and cathode and/or supply source. Moreover, this arrangement thus provide the heat and humidity required for proper operation of the fuel cell system.

As to the specific reactor shape, it would have been obvious to one skilled in the art at the time the invention was made to recognize that Condit et al inherently disclose tubular combustors, as Condit et al's catalytic combustors are in fluid communication with conduits for

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receiving and exhausting streams, and hence, since those conduits are either pipes or tube through which the fluid is conveyed, it would be obvious to make the combustor having a similar configuration so as to enhance fluid transmission or distribution throughout the entire fuel cell system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro
Examiner
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A handwritten signature in black ink, appearing to be 'RAM', with a long horizontal line extending from the bottom right of the signature.